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Standards for Living Organisms in Ship's Ballast Water Discharged in U.S. Waters.

Dear Sirs

We herewith have the pleasure in responding to your call for submissions in regard to the above referenced 'Advanced notice of proposed rulemaking: request for comments' document'. In accordance with your request, we have itemized our response in sequential manner with regard to the Possible Goals G1-G3, and Possible Standards S1-S4.

Question 1: All the Goals listed 1-3 have some failings.

In G1 for example, the statement refers to, *'No discharge of zooplankton and photosynthetic organisms..... etc'.*, presumably the qualifying word *'viable'* (meaning live/active) should be inserted before the word 'zooplankton'. If not then the discharge of presumably *non-viable* organisms would **NOT** be permitted and this would require sophisticated filtering equipment to remove non-active organisms. Filtering out inactive organisms adds cost and complexity and serves no beneficial purpose. Assuming the term 'viable' is implied, G1 would still likely be insufficient because viruses are excluded.

The G2 proposal, while admirable, is unlikely to be practical or cost effective. Potable water uses breakpoint chlorination, all chlorine demand has to be satisfied and a residual, 1-2ppm left over to ensure disinfection. To satisfy the chlorine demand of seawater under all conditions would require an indeterminate amount of chlorine, and is not likely to be practical. Potable water disinfection takes into account the low level of organic content when compared to seawater. Even in the case of the Great Lakes, raw lake water used for ballast is very different from potable water in regard to organic loading.

The G3 proposal is not appropriate for two reasons: 1) The effectiveness of ballast water exchange is not known, and 2) As stated in USCG-2001-10486: "As currently practiced, BWE produces varying results and sometimes may remove as few as 39% of the possible harmful organisms from the ballast tank." Current technology for ballast water treatment is capable of achieving much better results.

It is suggested that an ' Ideal Goal' be one that attains the maximum practical and cost effective ballast water treatment. This to be framed around a biological based parameter such as, not less than 98% kill of ALL organisms. This is a realistic goal that can be achieved using existing technologies.

Question 2: Adoption of Standards.

S1: Not recommended. This is partly on the way to achieving the suggested ' Ideal Goal' of not less than 98% kill of all organisms. However, as written S1 excludes all the potentially pathogenic bacteria and viruses.

S2 & S4: Not recommended. This is because they exclude treatment of potentially pathogenic bacteria and viruses.

S3: Recommended. This standard is closest to 'Ideal Goal'.

Question 3: Effectiveness of current technologies.

Very few current technologies are likely to be economically able to meet an appropriate standard as a single, stand alone BWT system. One likely technology that could meet a reasonable standard, i.e. S3, in terms of practicality, biological efficiency and cost effectiveness, is chemical treatment utilizing a low cost effective chemical such as sodium hypochlorite or bleach. Sodium hypochlorite can be produced cheaply, efficiently and cost effectively *in situ* using electrochlorination technology. This technology has been successfully utilized in other applications for over 25 years.

Question 4: Cost benefit, cost effectiveness.

Cost benefit, cost effectiveness analyses will be governed in part by the standard against which BWT systems will be judged. All existing technologies have some merit, and hybrid BWT systems using e.g. heat treatment + UV, or filtration +heat treatment, or centrifugation + oxygen deprivation etc....will have merit, but may be unlikely to achieve the S3 standard. Chemical treatment will likely meet the biological criteria of S3 but may have high capital and operational costs and considerations of crew safety will be an issue. On-site generation of sodium hypochlorite will have a small capital and operational cost profile. Reports in the literature as to the high installation cost and inefficiency of certain chemical systems did not take into account the use of on-site electrochlorination of seawater ballast. Any perceived drawbacks in relation to environmental impact will have to be set against the efficacy of such a system. Note also, environmental impacts can be significantly reduced by appropriate dosing techniques, as part of a ballast water management program. These techniques are readily applicable to a BWT system based on electrochlorination.

Question 5: Small Business Impact

The impact on small business of S1-4 is variable, but since S1, 2 & 4 are not considered appropriate, only S3 is relevant in this context. Here again the BWT used to attain S3 is the important factor and the arguments presented in answer to Q4 will apply.

Question 6: Environmental impact

While many technologies have only minimal environmental impact, they will most likely not be able to comply with the S3 standard in a cost effective manner. A BWT system based on electrochlorination can meet environmental impact criteria provided the chlorine dose is applied at a level consistent with biological control, while minimizing environmental impact. This will likely be achieved by the use of dosing and mixing techniques applied as part of a holistic approach to the treatment of ballast water. This approach will also include a detailed appraisal of the Ballast Water Management Program of each vessel or vessel class, and will involve integration of the vessel BWMP with the Loading/Offloading profile of the vessel in question

Sincerely yours

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